Large Data Visualization with PAT: Programmable Analysis Tool

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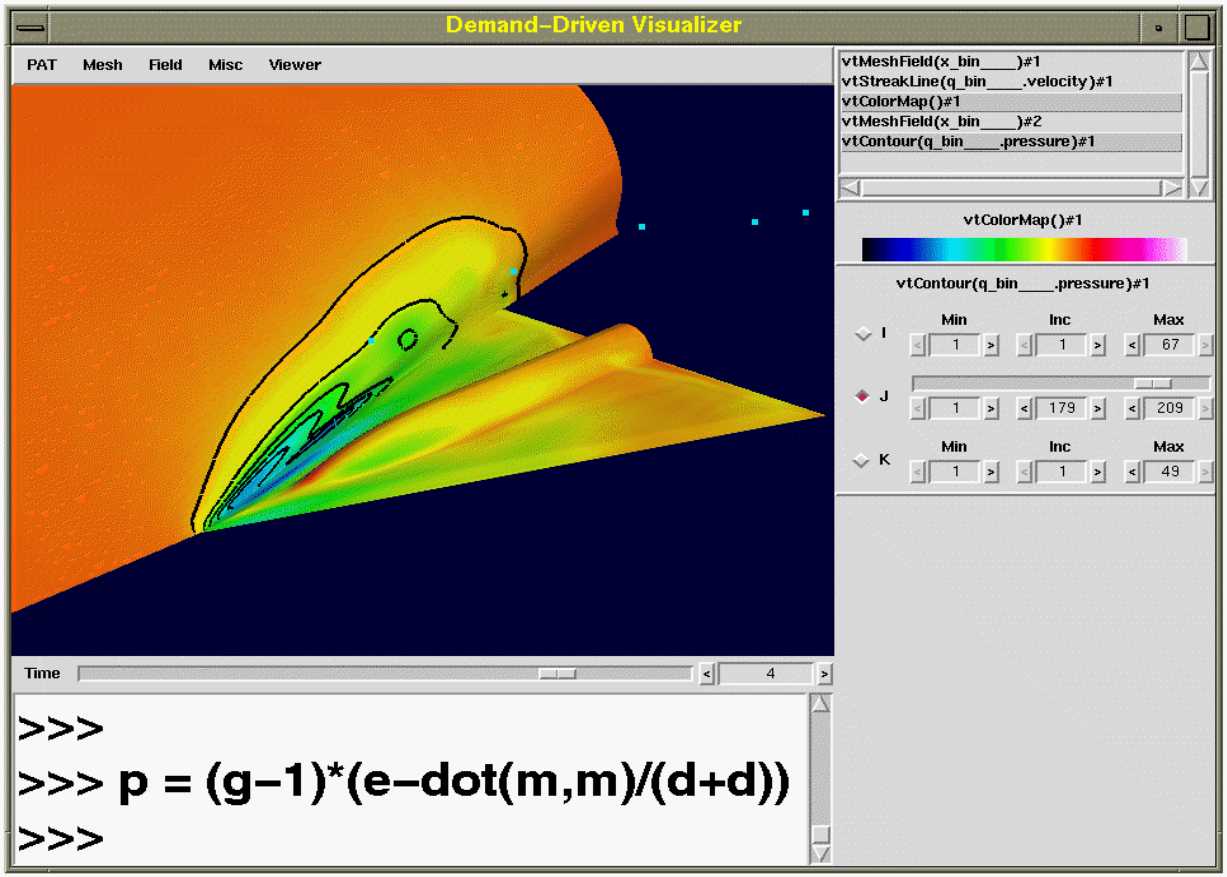
Big Data



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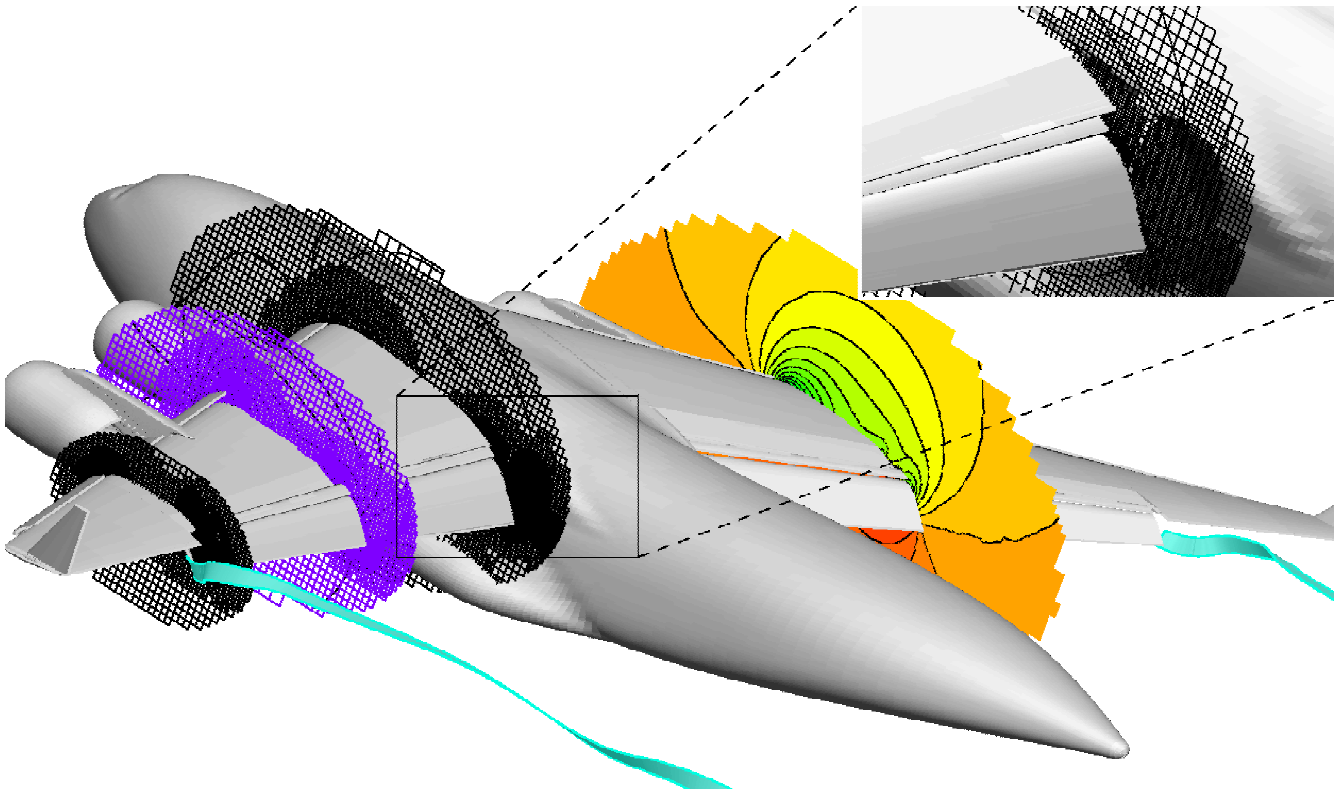
Garden of Grids



- e.g., CART3D, High-wing transport
  - M. Aftosmis

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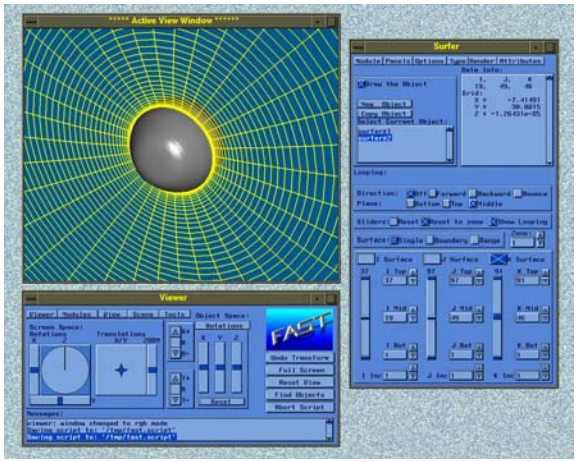
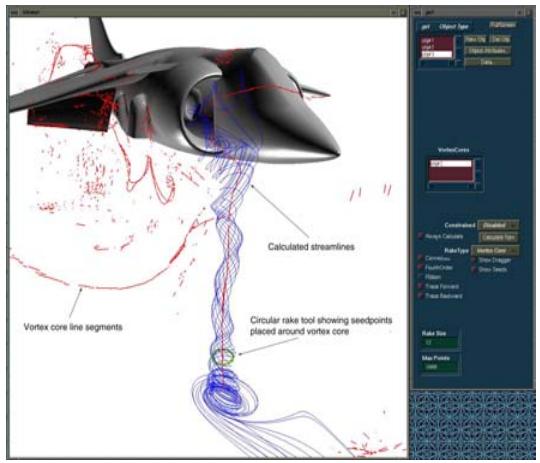
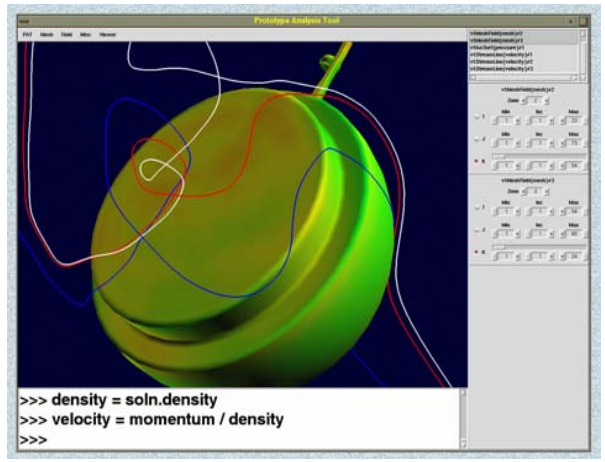
Previous Work







- FAST
- Gel
- *Prototype* Analysis Tool

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Initial Components

- Field Encapsulation Library (FEL2)
- VisTech
- graphics, direct-manipulation libraries

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Learnings

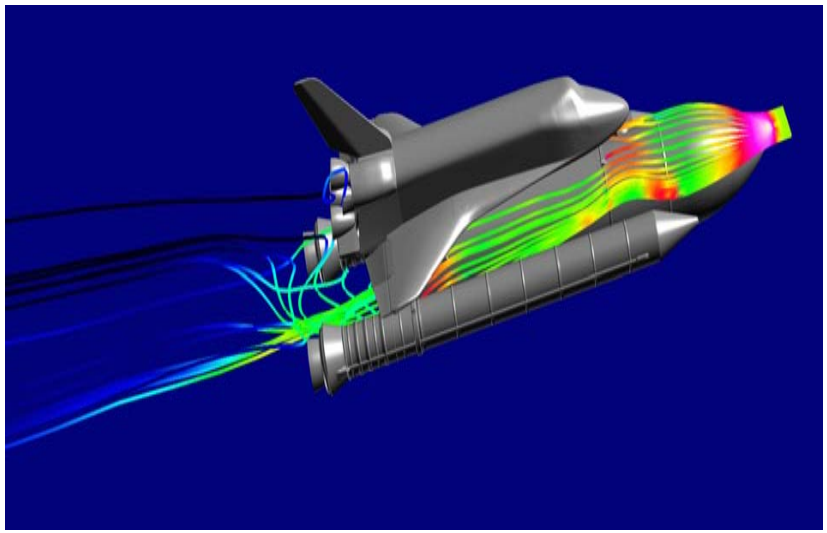
+ C++ and templates
+ out-of-core paging (Ellsworth & Cox)
+ demand-driven philosophy

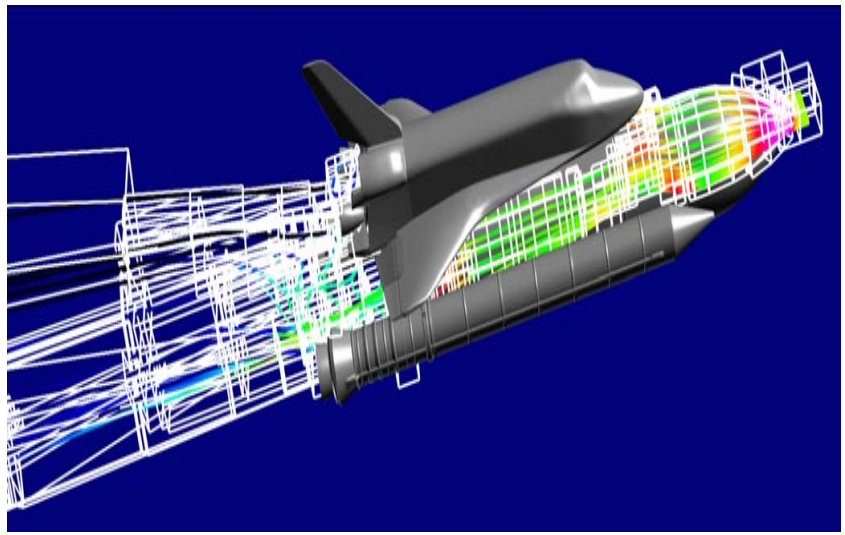
– need more general data model
– PLOT3D assumptions creep
– software distribution issues

Current Approach

- C++ components composed in Python
- demand-driven philosophy
- modular design
- flexible field model
- open source

Demand-Driven Evaluation





- many techniques touch small % of data
- often interested in derived values
- time-series data accentuate issues

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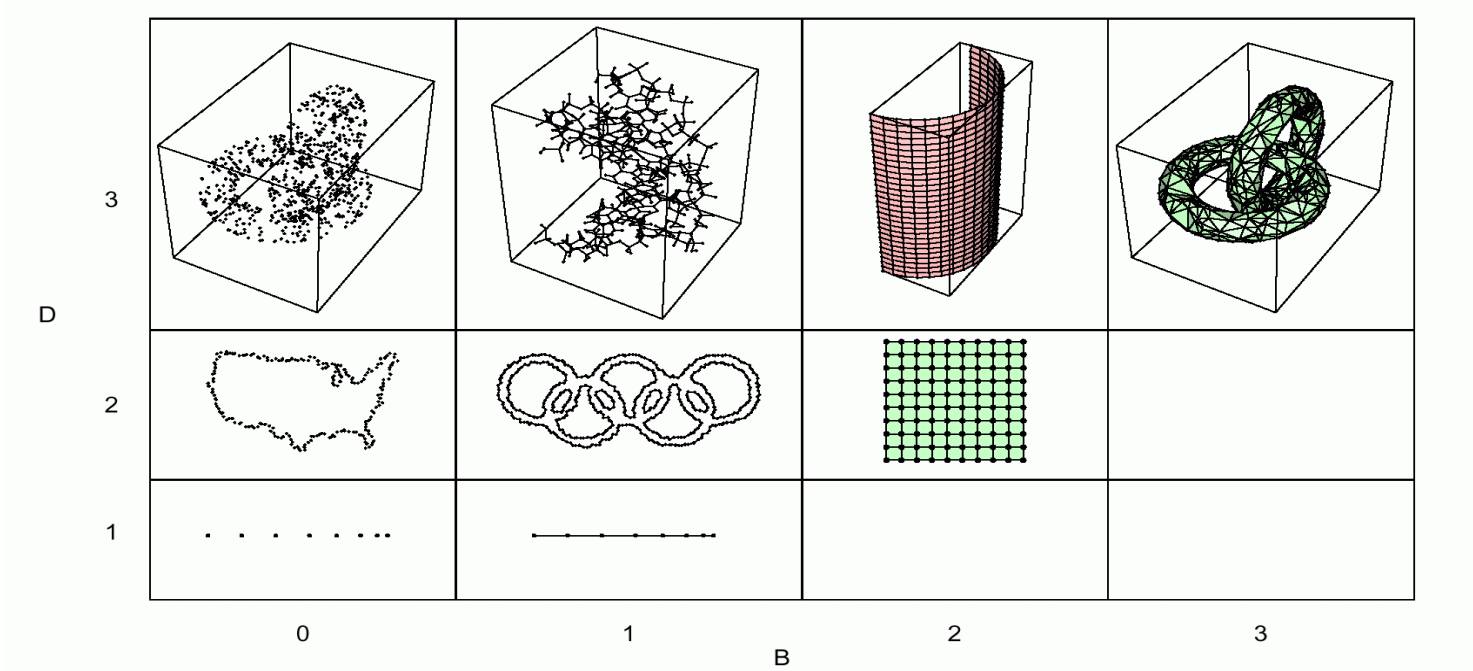
Field Model (FM)



- C++, templated base (B) and phys (D) dim.
- meshes with not necessarily manifold shapes
- work with data in-place

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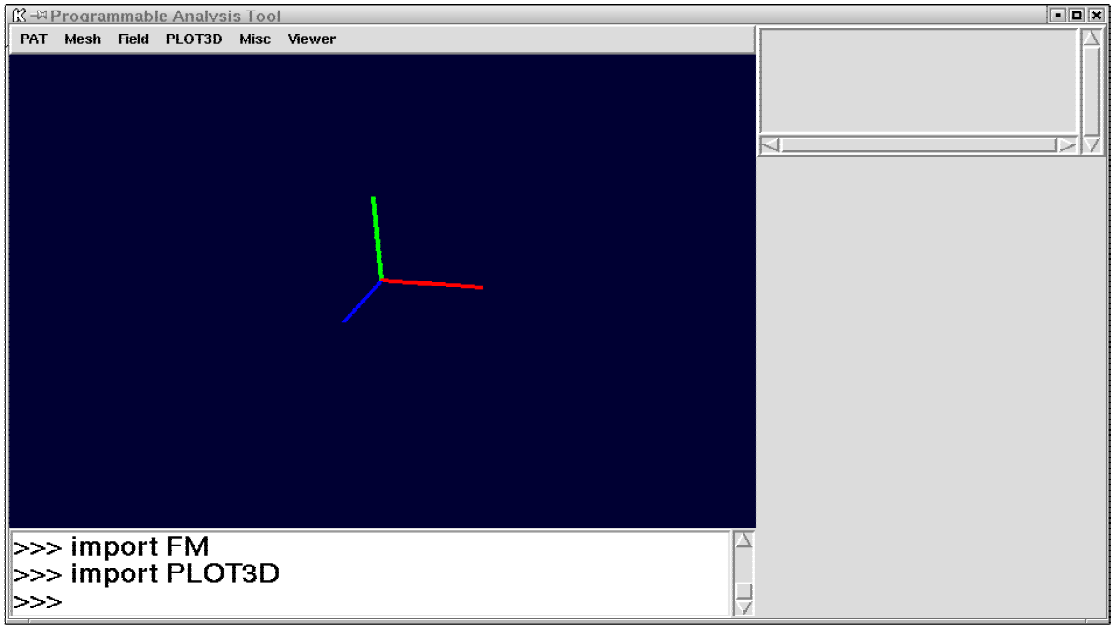
Python

- object-oriented
- interactive, interpreted
- extensible
- active user community
- many additional modules
- open source

Programmable Analysis Tool



- process capture, replay, programmability
- modularity, dynamic module import
- rapid prototyping

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Design Challenges in PAT

- direct interpreter window
- maintaining consistent state
- beginner users, advanced users
- parallel execution, serial GUI
- distributed visualization

SourceForge

- provides CVS repository host
- bug tracking, statistics, releases
- home to several relevant projects:
  - Python
  - PyOpenGL
  - Numeric
  - Chromium (parallel rendering)

SourceForge Statistics

July 18, 2001

- number of projects: 23,737
- number of registered users: 214,561
- page views: 1,423,131
- files downloaded: 197,929
- fifth most active project: Python

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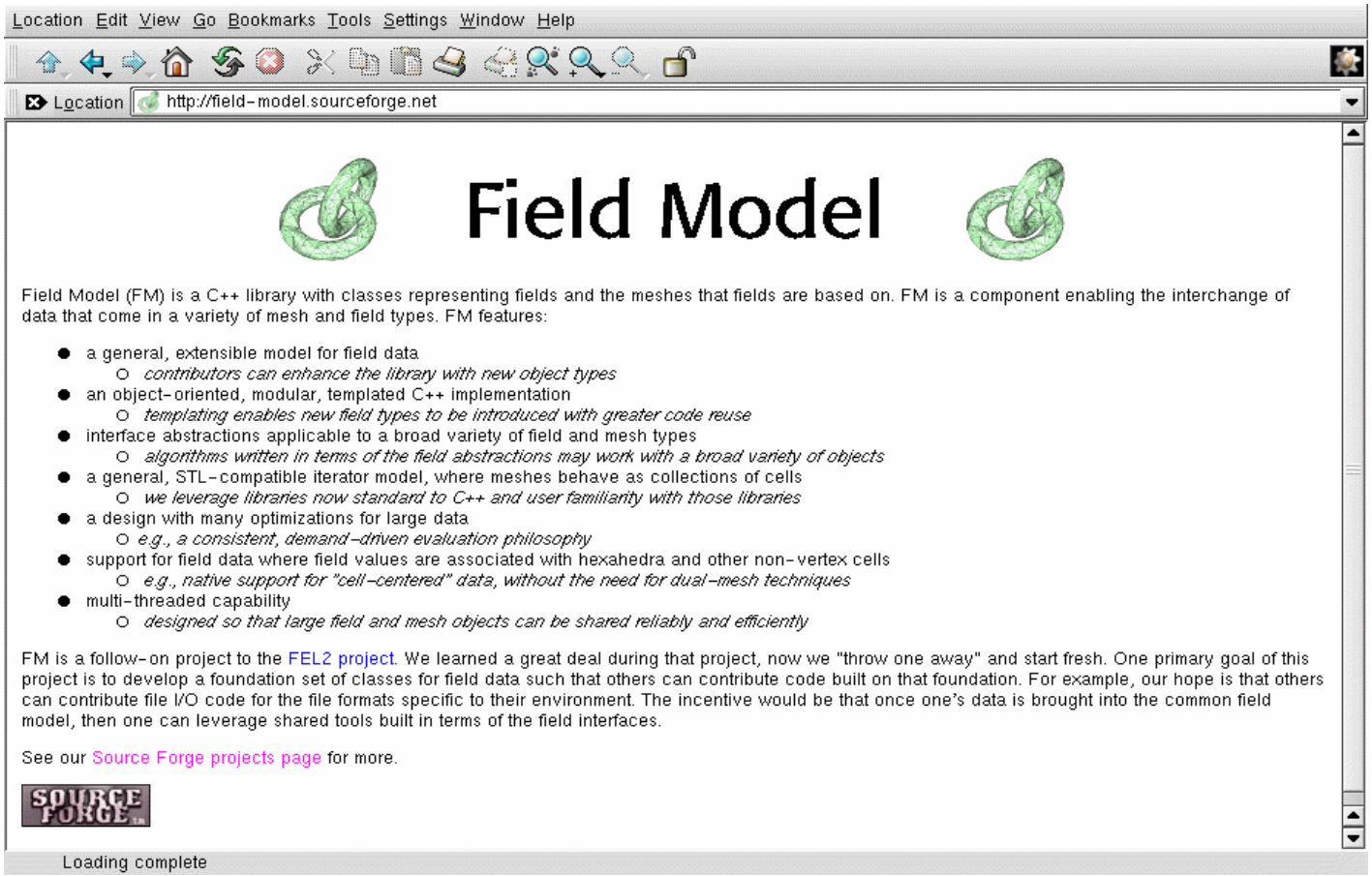
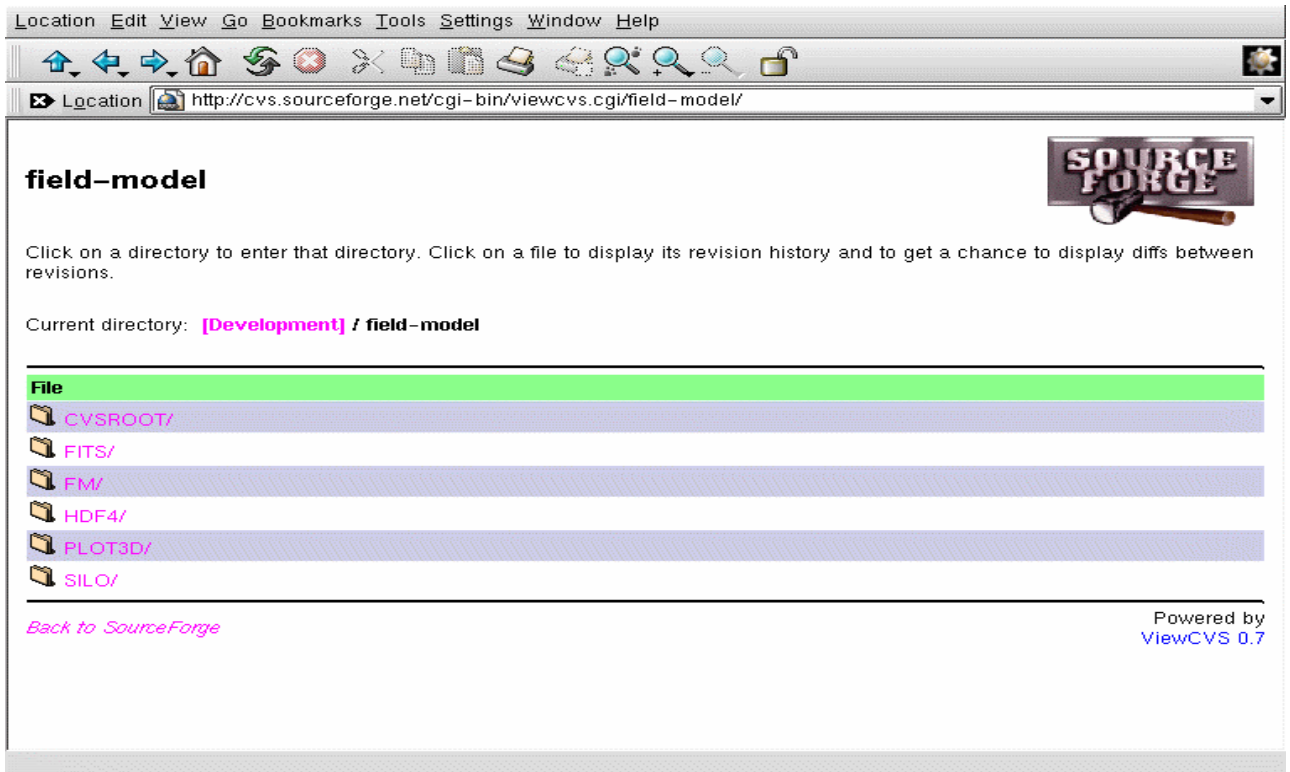
FM on SourceForge



- http://field-model.sourceforge.net/

FM Module Organization



- future candidates: CARD3D, Vis5D, CGNS, HDF5, PV3, TAG2D, TAG3D, etc.

Plans

- continue to fill out FM classes
- port paging to FM
- port VisTech to FM
- cultivate collaborators
- more documentation